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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,183	09/28/2001	Hannu Paananen	14765	5969

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Garden City, NY 11530

EXAMINER

MCINTOSH III, TRAVISS C

ART UNIT	PAPER NUMBER
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1623

10

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/967,183

Applicant(s)

PAANANEN ET AL.

Examiner

Traviss C McIntosh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The Amendment filed February 24, 2003 has been received, entered into the record, and carefully considered. The following information provided in the amendment affects the instant application by:

Claims 1, 8-13, 17-25, 28-31, and 36-39 have been amended.

Remarks drawn to rejections of Office Action mailed November 20, 2002 include:

Claim objections have been overcome by applicants' amendments and have been withdrawn.

112 2nd paragraph rejections have been overcome by applicants' amendments and have been withdrawn.

103(a) rejection which has been withdrawn and has been replaced with a new ground of rejection.

An action on the merits of claims 1-43 is contained herein below. The text of those sections of Title 35, US Code which are not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

Claims 1-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "weak" used in all instances, as in claim 1, is a relative term which renders the claims indefinite. The term "weak" is not defined by the claims and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Applicants are required to

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incorporate that which is intended as a weak acid by representative unit of measure, preferably in pH, which distinctly represents that which applicant intends as weak.

The term “strong” used in all instances, as in claim 9, is a relative term which renders the claims indefinite. The term “strong” is not defined by the claims and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Applicants are required to incorporate that which is intended as a strong acid by representative unit of measure, preferably in pH, which distinctly represents that which applicant intends as strong.

Claim 20 is indefinite wherein it is unclear as to that which applicant intends. The claim is drawn to “a concentration or filtration unit is arranged between chromatographic columns”. There is no previous recitation of multiple columns in the claim or those from which it depends. Claim 1, the claim from which it depends, refers to a multistep process, but indicates that “a weak acid cation exchange resin is used for the chromatographic separation” which implies that there is only one column. Changing the claim to depend from a claim which clearly sets forth the use of multiple columns, such as claim 17, would obviate the rejection at hand.

Claim Rejections - 35 USC § 103

Claims 1-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heikkilä et al. (4,359,430) of record in view of Qui et al. (CN 1234404A) newly cited.

The claims of the instant application are drawn to a method of separating sugars and non-sugars from a solution comprising passing the solution through at least one weak acid cation exchange column and at least one strong acid cation exchange column wherein the resin is in the form of a salt and is crosslinked with divinyl benzene (DVB) wherein the crosslinking degree of

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the resin is 3%-8% by weight and the particle size of the resin is $10\mu\text{m}$ to $2000\mu\text{m}$. Products to be isolated are betaine, inositol, mannitol, sucrose, erythritol, glycerol, and/or amino acids and the solution to be treated in the chromatographic column is a sugar beet solution (vinasse, molasses, or betaine molasses). The eluant used in the column is water in a temperature of between 10°C - 95°C . Additionally, there is optionally a concentration or filtration unit arranged between the columns, wherein the solution is concentrated by evaporation. The chromatographic separation can be a simulated moving bed process (either continuous or sequential) or a batch process and the feed solution has a pH of from 6-11.

Heikkilä et al. teaches of a process of separating betaine from the sugars and nonsugars of beet molasses by a chromatographic process (column 2, lines 7-10). The column contains a strong cation exchange in alkali form wherein sodium is generally the preferred alkali form and the elution material is generally water at 60°C - 90°C (column 2, lines 39-46). The resin is preferably a sulphonated polystyrene exchange resin crosslinked with from about 2 to about 12 percent and preferably 3-9 percent weight divinylbenzene (DVB) wherein they have a uniform particle size of about 0.2mm-0.5mm ($200\mu\text{m}$ - $500\mu\text{m}$). The feed is preferably a betaine-containing beet molasses, a rest molasses, or vinasse (column 2 lines 47-60). The elution material is recovered as a first nonsugar waste fraction, a second sugar-containing fraction, and a third containing betaine. The nonsugar and sugar fractions are then subjected to further treatments to recover the remaining materials (column 2, lines 62-69). Betaine is then recovered by evaporation and crystallization (column 3, lines 39-47). Heikkilä et al. also teach that multiple chromatographic steps may be preformed to obtain the desired compounds (column 4, lines 17-29).

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What is not taught by Heikkilä et al. is to use a weak acid ion exchange column additionally in the process.

Qui et al. teach a method of separating sugars, D-ribose, from a fermentation liquor comprising the multi-step chromatography process wherein a pre-treated fermented liquor is passed through a strong-acid cation exchange resin, a weak-base anion exchange resin, and a weak-acid cation exchange resin.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a multi-column chromatography process with at least one weak-acid cation exchange resin to separate sugars and non-sugars from a solution as divergent products are known in the art to be obtained at various pHs in chromatography columns because of their different properties and reactivity kinetics. One of ordinary skill in the art would recognize that the various products would be eluted at various rates in a chromatographic column based on both the properties of the column and compound eluted. It would be obvious to one of ordinary skill in the art at the time the invention was made to add an additional chromatographic column which has different properties than the first column to purify a solution which has multiple compounds that would react differently to different columns and be eluted at different rates among the various columns. One would be motivated to have a multi column system and or a column with various zones which have different properties, such as ionic strength, to separate various compounds which are in the same solution as the products would be eluted at rates dependent upon the column/compound properties. One would be motivated to add the weak-acid cation exchange resin column of Qui et al. as Qui et al. teach that this column, especially when used in

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conjunction with other columns such as a strong-acid cation exchange column, is effective in removing sugars from a solution which has multiple compounds.

Applicant's arguments with respect to claims 1-43 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

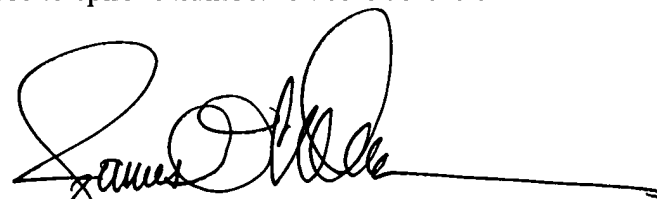
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Traviss C McIntosh whose telephone number is 703-308-9479.

The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson can be reached on 703-308-4624. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3014 for regular communications and 703-305-3014 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Traviss C. McIntosh
May 19, 2003



James O. Wilson
Supervisory Patent Examiner
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